

2/M—24 (vi) (Syllabus-2005)

2009

PHYSICS

(Honours)

SIXTH PAPER (Phys-212)

(Wave, Acoustic and Optics)

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Answer any **five** questions

1. (a) Show that the velocity of transverse waves in a stretched string is $v = \sqrt{T/m}$, where T = tension in the string and m = mass per unit length. 7
- (b) Show that the number of beats in the sound of two sources is equal to the difference in frequencies of the sources. 5
2. What is live and dead room? Derive Sabine's formula for reverberation, and obtain the absorption coefficient. 3+6+3=12

3. (a) Prove that $y = x^2 + c^2 t^2$ is a solution of one-dimensional wave equation, where c is wave velocity, t is time and x is the position coordinate. 4
- (b) A string of length 2 m is divided into three segments, such that their frequencies are in ratio 1 : 2 : 3. Find the length of each segment. 4
- (c) What is double refraction? Discuss with example of polaroid. 2+2=4
4. With necessary diagram, define interference of light. What are the conditions necessary for interference? Prove that the distance between two consecutive bright and dark fringes is the same. 2+3+7=12
5. (a) What is a zone plate? Show that the ~~area of the n th zone is independent of n~~ . 2+6=8
- (b) Describe different methods of polarisation. 4
6. (a) What is chromatic aberration? Prove that axial chromatic error for parallel rays is $f_r - f_R = \omega f$, where the symbols have their usual meanings. 2+5=7
- (b) Obtain the relation for the equivalent focal length of two thin lenses in contact. 5

7. (a) What is normal and anomalous dispersion? 2+2=4
- (b) Discuss the theory of dispersion in detail. 8
8. Write short notes on any *two* : 6×2=12
- (a) Fabry-Perot interferometer
- (b) Explanation of the formation of Newton's rings
- (c) Concave grating

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